



# REINFORCED CONCRETE STRUCTURE TO EC2

## 17<sup>TH</sup> RUN – 08 OCT 2019

### Course Objectives

This one-day course covers the detailed design of reinforced concrete structural elements to Eurocode 2 (EC2). The emphasis is on buildings that are constructed *insitu*, braced by structural walls and are non-sway.

From April 2015, the Building Construction Authority will no longer accept designs to BS8110/CP65, the code currently used for the design of concrete buildings. Thus it is essential that local engineers become familiar with EC2 (SS EN 1992 Design of concrete structures).

Each country that uses the Eurocode can write its own National Annex, a document that modifies the Eurocode for the conditions found locally. Singapore published its National Annex in 2008, specifying more appropriate durability factors, etc. This course is based on the Singapore National Annex. Where appropriate, reference is made to the UK National Annex and other documents.



***“It is considered that there is scope for risk to structural safety if users lack the requisite competence when needed”***

SCOSS (Standing Committee on Structural Safety) Report 14

### CPD PROGRAMME

7 PDU /  
6 STU(Structural)

### FUNDING

SkillsFuture Credit / UTAP  
(Terms and conditions apply)

### COURSE DETAILS

#### Fees

\$299.60 (IES members)  
\$353.10 (Non-members)

#### Date & Time

08 Oct 2019, Tuesday  
9.00am – 5.15pm

#### Venue

IES Academy@ Jurong East  
80 Jurong East St 21 #04-10  
Devan Nair Institute for  
Employment and  
Employability  
Singapore 609607

## Course Outline

The contents of the course are as follows:

- 1) Introduction
- 2) General Requirements (analysis methods; bracing and second order effects; geometrical imperfections; loading; stability; progressive collapse)
- 3) Materials (basic properties of concrete and steel)
- 4) Cover (bond; durability; fire)
- 5) One-way slabs (flexure; shear; deflection)
- 6) Beams (flexure, shear and deflection)
- 7) Columns (short vs slender; interaction diagrams)
- 8) Flat slabs (flexure, shear, punching and deflection)
- 9) Foundations (pad, pile cap, mass concrete foundation)
- 10) Detailing (lap and anchorage lengths, permissible bar bends)
- 11) Derivations of formulas used
- 12) Introduction to calculation of Wind Loads using EC1

Worked Example: Design of a 4-storey building (consisting of RC frames, slabs, and structural walls, all on pad foundations)

## Target Audience

This course will benefit civil and structural designers, builders and Resident Engineers.



## CV of Trainer

Er. Dr. Niall MacAlevey is currently an independent consultant specializing in the analysis and design of reinforced and prestressed concrete structures, forensic engineering and the strengthening of concrete structures. He is the founder of the firm "Shamrock Consultants" and is a registered Professional Engineer in Singapore.

After graduating from University College Dublin, Ireland in 1987 with a B.E. (Civil) degree, he then obtained his M.Sc. degree in "Concrete Structures" from Imperial College, London in 1988. He completed his Ph.D degree at the Nanyang Technological University in 1997 on "The Strengthening of Concrete Structures" and later joined the academic staff there. He obtained a PGDipTHE (Post-Graduate Diploma in Teaching in Higher Education) from the National Institute of Education in 2001.

He has worked for a number of consulting engineering firms and specialist prestressing subcontractors in London, Cambridge, Hong Kong and Singapore. He is the author of two books: *Structural Engineering Failures-lessons for design* and *Preliminary Design of High-Rise Buildings in Non-seismic Regions*. Both books are available from Amazon.com.



## **REGISTRATION FORM**

### **REINFORCED CONCRETE STRUCTURE TO EC2 (17th Run)**

<b>Date of Course</b>	:	<b>08 October 2019 , Tuesday</b>			
<b>Course Time</b>	:	<b>9.00am to 5.15pm</b>			
<b>Venue</b>	:	<b>IES Academy@Jurong East 80 Jurong East Street 21 #04-10 Devan Nair Institute (e2i) S(609607)</b>			
<b>Course Fee</b>	:	<b>\$299.60 (IES Members) / \$353.10 (Non Members)</b>			
<b>CPD Programme</b>	:	<b>7 PDU / 6 STU (Structural)</b>			
<b>Course Coordinator</b>	:	<b>Jessie Tan IES Academy@Jurong East 80 Jurong East Street 21, #04-10 Devan Nair Institute (e2i) S(609607) Tel: 6461 1250 Email: jessie.tan@iesnet.org.sg</b>			
<b>Closing Date</b>	:	<b>30 September 2019 or when class is full</b>			
<b>Participant's Details:</b>					
<b>Name</b>	:		<b>NRIC/FIN No</b>	:	
<b>Company</b>	:		<b>Designation</b>	:	
<b>Address</b>	:				
			<b>Postal Code</b>	:	
<b>Mobile</b>	:		<b>Office</b>	:	
<b>Email</b>	:				
<b>Please indicate (where applicable)</b>		<input type="checkbox"/> <b>IES Member No:</b>		<input type="checkbox"/> <b>PE / RE No:</b>	
		<input type="checkbox"/> <b>Non Member</b>	<input type="checkbox"/> <b>Company Sponsor</b>	<input type="checkbox"/> <b>Special meal - Vegetarian</b>	
<b>Contact Person's Details (HR/Accounts Department)</b>					
<b>Name</b>	:		<b>Designation</b>	:	
<b>Mobile</b>	:		<b>Office</b>	:	
<b>Email</b>	:				
<b>Payment Details</b>		<b>Cash/Cheque/Nets:</b>		<b>Amount:</b>	
<ul style="list-style-type: none"> <li>Cheque to be made payable to 'ENGINEERS SINGAPORE PTE LTD'</li> <li>Written Notice via email is required for Cancellation or Withdrawal of course, 7 working days prior to course date</li> <li>Course fee inclusive of 7% GST, course materials and Halal refreshments</li> <li>Certificate of Attendance will be issued to participants with 100% Attendance</li> </ul>					
<b>Acceptance of Terms &amp; Conditions for Registration of IES Academy's Courses/Events</b>					
<b>I agree to abide by the Terms and Conditions for Registration of IES Academy's courses/events.</b>					
<b>Name:</b>					
<b>Signature:</b>					
<b>Date:</b>					

## **TERMS & CONDITIONS COURSE REGISTRATION**

### **Registration**

Any registration, whether online, fax or by email, will be based on a first-come-first-served basis and will only be confirmed upon receipt of full payment by Engineers Singapore Pte Ltd unless otherwise invoice to company.

All registrations must be submitted with duly completed registration form.

### **Closing Date & Payment**

The closing date of the event will be 1 week prior to event commencement date. Cheques should be crossed 'A/C payee only' and made payable to **'ENGINEERS SINGAPORE PTE LTD'**, with the **Date of event, Title of The Event and participants' name indicated clearly on the back of the cheque**, and post to:

Attn: Jessie Tan  
IES Academy@Jurong East  
80 Jurong East Street 21 #04-10  
Devan Nair Institute for Employment & Employability  
Singapore 609607

### **Confirmation of Registration**

Confirmation of registration will be given at least one week before the commencement date of event via email. ***If you do not receive the said confirmation email, you are required to contact IES Academy at 6463 9211 during office hours.***

IESA reserves the right to allow only confirmed and paid registrants to attend the Event.

### **Withdrawals/Refunds of Fees**

- Written notice at least 1 week in advance before the commencement of the event
- Full course fee shall be refunded subjected to 4.5% transaction charge
- **NO** refund otherwise.
- No-show of participant would not be accepted as a valid reason for withdrawal/refund.
- One time replacement is allowed only if written notice is received by us at least 1 week before the commencement of the event. However, when an IES member is replaced by a non-member, the participant has to pay the difference in the relevant fees.

### **Cancellation/Postponement**

Changes in Venue, Dates, Time and Speakers for the Events can occur due to unforeseen circumstances. IESA reserves the full rights to cancel or postpone the Event under such circumstances without prior reasons. Every effort, however, will be made to inform the participants or contact person of any cancellation or postponement.

Fees will be refunded in FULL if any Event is cancelled by IESA.

### **UTAP Funding**

UTAP (Union Training Assistance Programme) is an individual skills upgrading account especially for NTUC members. As a member, you enjoy UTAP funding at 50% of the unfunded course fee capped at \$250 every year.

**SkillsFuture Credit (SFC)** "All Singaporeans aged 25 and above can use their \$500 SkillsFuture Credit from the government to pay for a wide range of approved skills-related courses. Visit the SkillsFuture Credit website ([www.skillsfuture.sg/credit](http://www.skillsfuture.sg/credit)) to choose from the courses available on the SkillsFuture Credit course directory."

Please visit [here](#) for more information on SFC & UTAP claim.

### **Personal Data Protection Act**

By registration, you consent to the processing by Institution of Engineers, Singapore of personal data, including your sensitive personal data as defined in the Data Protection Act 2014 for the proper purposes of Institution of Engineers, Singapore (IES). You undertake to observe the provisions of the Data Protection Act 2014 in relation to any personal data you may hold and process as a Members of Institution of Engineers, Singapore, and you agree to indemnify Institution of Engineers, Singapore from liability for any claims or damages that may arise from the processing of this data. For more information kindly refer to [here](#).

### **Enquiries**

For further enquiries, please contact IESA general office at Tel: 6463 9211.